1,074,741

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Pile Fabrics

We, BIGELOW-SANFORD INC., a Corporation organized under the laws of the State of Delaware, United States of America, of Thompsonville, State of Connecticut, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to pile fabrics for floor covering, such as carpets and rugs, herein for convenience called carpet.

The invention provides a pile fabric floor covering comprising a backing of interwoven weft threads and warp threads, pairs of weft threads extending through sheds, each shed being formed by at least one warp thread passing over a pair of weft threads and at least one other warp thread passing under the pair of weft threads, each shed of warp threads acting so as to urge together the pair of weft threads extending through the shed, and tufts each comprising a single leg of pile yarn cut at each end, one end of each leg projecting substantially perpendicularly from the backing to form the pile, the other end of each leg extending between the two weft threads in a pair of weft threads in a shed, the tufts being gripped by the weft threads as a result of the said action of the warp threads urging together weft threads, the gripping forces acting in a plane substantially perpendicular to the direction in which the said one end of the tuft projects from the backing.

The pile tufts may comprise nylon fibres and the fibres of the ends of the pile tufts on one side of the backing are fused together.

Alternatively an adhesive material may be disposed on the ends of the pile tufts and adjoining backing strands at one side of the backing, and a layer of textile fabric united to the said pile tufts by the said adhesive, leaving spaced empty spaces between the said textile fabric and the said backing.

Specific constructions of carpet embodying the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a schematic view in perspective illustrating a carpet construction wherein the spacing between the warp and weft strands of the backing is exaggerated for purposes of illustration.

Figure 2 is a vertical sectional view on line 2—2 of Figure 1 looking in the direction of the arrows,

Figure 3 is a vertical sectional view taken on line 3—3 of Figure 1 and looking in the direction of the arrows,

Figure 4 is a view similar to Figure 3 showing a modification, and

Figure 5 is a view similar to Figure 3 showing another modification.

Referring to the drawings, the backing fabric, indicated generally at 2, Figure 1, comprises wefts 4, 6, a weft 4 and a weft 6 forming a pair of simultaneously inserted wefts. Interwoven with the wefts 4, 6 are spaced pairs of warp threads each pair comprising a warp thread 8 and a warp thread 10. The warp threads 8 are woven under the alternate weft pairs 12 and over the intermediate weft pairs 14. The other warp thread 10 of each pair is woven over the alternate weft pairs 12 and under the intermediate pairs 14. In the drawing the strands of the backing are more widely spaced than they are in the actual fabric in order to simplify illustration of the fabric construction. The two warp threads 8, 10 of each pair are disposed closely together weftwise of the fabric.

The pairs 12, 14 of wefts are separated from each other by the crossing of the warp

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threads 8, 10. The warp threads 8, 10 do not at any point lie between the two wefts 4, 6 which constitute a pair. The warp threads therefore tend to urge the two wefts of a pair toward each other.

The pile face is formed by the pile tufts 16 which extend through the backing fabric 2, having their lower ends 16' projecting slightly below the backing, say about 1/4" or less below the backing. These pile tufts 16 consist of a single leg only. The pile tufts 16 are inserted in the backing so that they are arranged in warpwise and weftwise rows. In the warpwise rows the pile tufts 16 lie between adjacent pairs 8, 10 of warp threads. In the weftwise rows the pile tufts 16 are inserted to lie between the two wefts 4 and 6 of each weft pair 12 or 14.

The fabric is woven on an Axminster loom and the pile tufts 16 may be inserted by tube frames. In order to insert the pile tufts between the two wefts 4, 6 of a pair, these wefts must be separated or spaced apart during the wipe-in motion of the tube frame, which separation may be accomplished in any desired suitable manner, for example by the procedure and apparatus disclosed in British Patent Specification No. 15587/15. When the pile tufts have been wiped in between the separated wefts constituting a pair, the pile yarns are then drawn upwardly to leave the appropriate length of pile yarn extending below the backing structure at 16' whereupon the pile yarns are severed at a point sufficiently above the backing to form pile tufts 16 of the desired height. The next beat up of the lay brings the wefts 4, 6 of the pair together, gripping the pile tuft 16 between them, whereupon the heddles are manipulated to reverse the shed of warp threads 8 and 10 to hold the beaten up weft pair in place in the fabric. Gripping of the pile tuft yarn 16 between the wefts of a pair contributes to firm binding of the pile face in the backing structure 2. The warp threads are woven under substantially equal tension and the wefts lie substantially in a single plane.

The construction of this example is such that the pairs 8, 10 of warp threads lie closely against the adjoining pile tuft leg 16, thus providing that the backing structure 2 grips each pile tuft 16 weftwise as well as warpwise.

The carpet of the example shown in Figure 4 has a liquid adhesive coating applied to its back to aid in further securing the pile tufts 16 to the backing 2 and to impart desirable characteristics to the completed fabric. Such back coating is applied, in this example, by a doctor blade or other means which will tend to lay the lower ends 16' of the pile tufts over against the strands of the backing structure 2 and in such a way as to coat the lower ends of the pile tufts 16' and at least adjacent portions of the wefts and the warp threads with films of adhesive 20 but to leave open or empty pockets or spaces distributed over the back between the pile ends 16' and the back of the backing structure 2. The fabric may be finished by applying over adhesive coating 20 a thin textile fabric 22. The pile ends 16' will lay over to a greater or lesser extent depending upon their length, the fibres from which they are formed, and other conditions. Some or all of the pile ends 16' may remain relatively straight, or may partly or entirely straighten up again after they have been coated. In any case, in this example the adhesive 20 is so applied that after the textile fabric 22 is in place there remain open pockets or spaces between the carpet backing 2 and the fabric 22 and between the pile tuft ends 16'. Such open spaces tend to cause the carpet backing to provide a highly desirable cushioning effect.

Referring to Figure 5, when the pile tufts 16 are formed of a thermoplastic or fusible material, for example of a polyamide, we have discovered that the lower ends 16' advantageously may be treated by application of heat to cause fusion of the fibres of the pile tufts. Upon fusion the nylon tends to "pill" or assume a global shape 18 and may adhere to adjoining weft and warp strands. Such fustion treatment further contributes to secure binding of the pile tufts 16 into the backing. Such fusion treatment may be applied by means of wires heated to a temperature of about 400° F., for example, or by any other suitable means.

The pile fabric of these examples exhibits a sharp pattern delineation due to the fact that each pile tuft 16 comprises a single leg only and tends to stand upright because of the way in which it is located in the backing structure so that the binding forces applied to it by the warps and wefts are symmetrical and do not tend to cause the pile tuft to depart from an upright position. The insertion of the pile tufts between the two wefts constituting a simultaneously-inserted pair, such wefts being constrained toward each other by the warp threads, tends to bind the pile tufts securely into the backing fabric. In particular, as may be seen from Figure 2, the gripping forces of the weft threads exerted on the tufts act in a plane substantially perpendicular to the direction in which the tufts project from the backing to form the pile.

Thus, it will be seen that the carpet of these examples consists of a backing structure and a pile face. The backing structure is formed from warps and wefts, the wefts being inserted in pairs, as is customary in Axminster manufacture, and the pairs of wefts being separated warpwise of the fabric by crossings of warp threads. The warp threads also are disposed in pairs.

The carpets of these examples have not only an attractive pile face in which the

pattern may be sharply delineated but has many other advantages.

In these examples there is provided good pile coverage of the backing structure and wherein the pile elements are firmly secured in the backing. Further the pile tufts consist of a single leg only but are firmly bound into the backing structure.

These examples further provide a carpet having a backing construction which provides a built-in cushion.

At the same time the fabric is inexpensive as contrasted with an Axminster fabric wherein the pile tufts are in the shape of a V, the lower end 16' having been turned upwardly about one of the wefts and being sufficiently long to form an additional pile leg. A greater yield of carpet yardage is produced for each set of yarn spools in manufacturing the carpet of these examples. For example, yields of the order of 590 yards may be produced from a single set of yarn spools as contrasted with only 340 yards from a set of yarn spools when weaving V-tuft Axminster carpet. Since fewer spool changes are required the cost is reduced because of the increased operational time of a set of yarn spools. With the carpet construction of these examples there is less yarn waste in shearing. Further the weaving speed can be increased with fewer operational interruptions, and other advantages in manufacture and product are obtained, while yet providing a highly desirable carpet product.

WHAT WE CLAIM IS:—

1. A pile fabric floor covering comprising a backing of interwoven weft threads and warp threads, pairs of weft threads extending through sheds, each shed being formed by at least one warp thread passing over a pair of weft threads and at least one other warp thread passing under the pair of weft threads, each shed of warp threads acting so as to urge together the pair of weft threads extending through the shed, and tufts each comprising a single leg of pile yarn cut at each end, one end of each leg projecting substantially perpendicularly from the backing to form the pile, the other end of each leg extending between the two weft threads in a pair of weft threads in a shed, the tufts being gripped by the weft threads as a result of the said action of the warp threads urging together weft threads, the gripping forces acting in a plane substantially perpendicular to the direction in which the said one end of the tuft projects from the backing.

2. A pile fabric floor covering as claimed in claim 1 wherein said pile tufts comprise nylon fibres and the fibres of the ends of the pile tufts on one side of the backing are fused together.

3. A pile fabric floor covering as claimed in claim 1, wherein an adhesive material is disposed on the ends of the pile tufts and adjoining backing strands at one side of the backing, and a layer of textile fabric is united to said pile tufts by said adhesive, leaving spaced empty spaces between said textile fabric and said backing.

4. A pile fabric floor covering substantially as hereinbefore described with reference to, and illustrated in, Figures 1 to 3 of the accompanying drawings.

5. A pile fabric floor covering substantially as hereinbefore described with reference to, and illustrated, in Figure 4 or Figure 5 of the accompanying drawings.

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1074741 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of the Original on a reduced scale

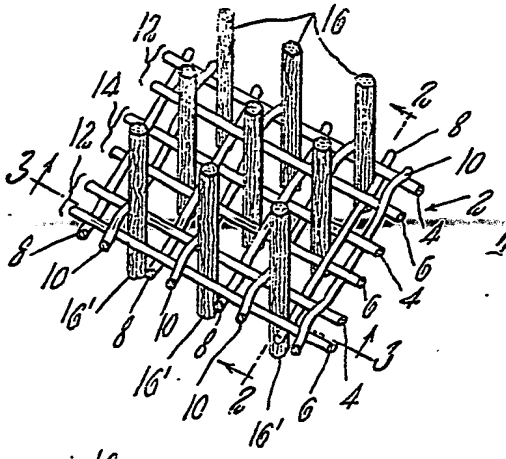

Fig. 1.

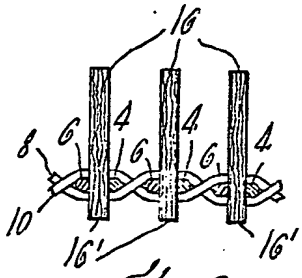

Fig. 2.

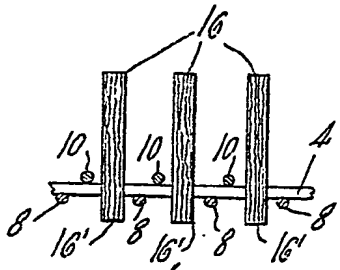

Fig. 3.

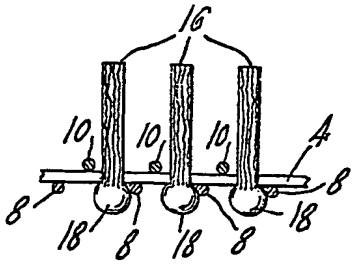

Fig. 5.

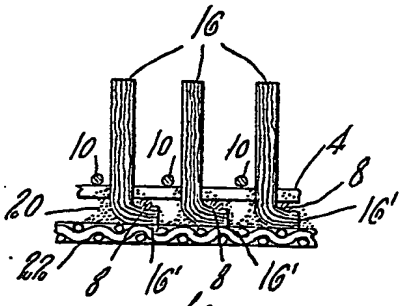

Fig. 4.